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Indian Standard

SPECIFICATION FOR CARTRIDGE FUSE-LINKS FOR AUTOMOBILES

(First Revision)

First Reprint AUGUST 1977

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February 1975

AMENDMENT NO. 1 OCTOBER 1980
TO
IS : 2577-1974 SPECIFICATION FOR CARTRIDGE FUSE-LINKS FOR AUTOMOBILES

(*First Revision*)

Alteration

(*Page* 5, *Table* 1, *col* 4 *and* 5) — Substitute the following for the existing matter:

CAP LENGTH *B*	
Max	*Min*
(4)	(5)
mm	mm
7	6·5
7	6·5
7	6.5
10	9·5

(ETDC 14)

Printed at Printograph, New Delhi, India

AMENDMENT NO 2 SEPTEMBER 1982
TO
IS:2577-1974 SPECIFICATION FOR CARTRIDGE FUSE-LINKS FOR AUTOMOBILES

(First Revision)

Alteration

(*Page 9, clause 6.10*) - Substitute the following for the existing clause:

'6.10 Life Test - The fuse-link subjected to vibration test shall carry a current equal to 110 percent of the rated current for 1 000 hours. The test may be carried out at any convenient voltage. The rated current shall be maintained within a tolerance of $^{+2}_{-0}$ percent, during the test. The minimum duration of continuous run of the test shall be not less than 30 minutes.'

(ETDC 14)

Reprography Unit, ISI, New Delhi, India

Indian Standard

SPECIFICATION FOR CARTRIDGE FUSE-LINKS FOR AUTOMOBILES

(First Revision)

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR CARTRIDGE FUSE-LINKS FOR AUTOMOBILES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 October 1974, after the draft finalized by the Automobile Electrical Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was first published in 1963. The revision has been undertaken to update the contents and introduce further variety reduction in current ratings.

0.3 In order to protect the automobile electrical equipment against excessive currents, fuse-links are inserted. Owing to number of circuits and accessories, it might become necessary to insert fuse-links into each circuit depending on the load requirements. This standard is intended to cover such fuse-links for automobiles.

0.4 Considering the importance of achieving interchangeability, this standard lays down dimensions also, in addition to the performance requirements and methods of tests.

0.5 Porcelain or moulded fuse-links are covered by *IS : 7528-1974.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard relates to cartridge fuse-links for use in dc circuits of automobile wiring and equipment.

1.2 This standard does not cover fuse-links for ac circuits.

---

*Specification for porcelain (moulded) fuse-links for automobiles.

†Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Fuse — A device that by the fusion of the fuse-element, opens the circuit in which it is inserted when the current through it exceeds a given value. A fuse comprises all the parts that form the complete device.

2.2 Cartridge Fuse-link — A cartridge containing a fuse-element.

2.3 Cartridge — A totally enclosing fuse-element container made of insulating material tubular in form and having its ends enclosed in metallic caps.

2.4 Fuse-Element — That part of a cartridge fuse-link which is designed to melt and thus open a circuit.

2.5 Rated Current — The current stated by manufacturer that the cartridge fuse-link will carry continuously without deterioration in accordance with this standard.

2.6 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of cartridge fuse-link.

2.7 Routine Tests — Tests carried out on each cartridge fuse-link to check requirements which are likely to vary during production.

3. RATED CURRENT

3.1 The preferred rated currents for cartridge fuse-links shall be 3, 6, 10, 30 and 40 A.

4. MATERIAL AND CONSTRUCTION

4.1 Material — Fuse tubes shall be of clear glass. Fuse caps shall be of brass or copper. Caps shall be plated with nickel, cadmium or other material having equivalent electrical and protective properties.

4.2 Construction

4.2.1 The fuse caps shall be tightly attached to the top, and the ends shall be square with the axis and free of solder. The joint between the fuse-elements and the end-caps shall be such that they shall not become disconnected before the fuse-element melts.

4.2.2 The construction shall be such that the fuse material and caps stay fixed well in position on the insulating body. This shall be achieved by locking the two cap ends in slot provided in the insulating body. Flute for the fuse-wire shall be sufficiently deep and the fuse-wire shall be laid on its bottom.

5. DIMENSIONS

5.1 The dimensions of automobile cartridge fuse-links shall be as given in Table 1 read with Fig. 1A or 1B.

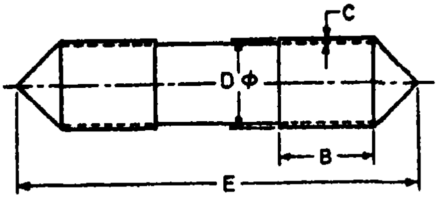

Fig. 1A Fuse-Links with Conical Ends

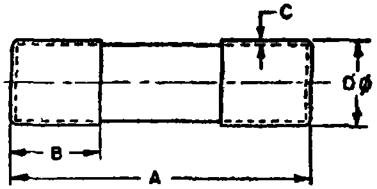

Fig. 1B Fuse-Links with Flat Ends

TABLE 1 DIMENSIONS OF CARTRIDGE FUSE-LINKS FOR VARIOUS CURRENT RATINGS

Rated Current	Length A	Length E	Cap Length B Max	Cap Length B Min	Thickness C Min	Diameter D
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	mm	mm	mm	mm	mm	mm
3	16 ± 0·5	22 ± 0·5	6·5	6·0	0·2	6·35 ± 0·08
6	19 ± 0·5	25 ± 0·5	7	6·5	0·2	6·35 ± 0·08
10	22 ± 0·5	28 ± 0·5	7	6·5	0·2	6·35 ± 0·08
30 40	36 ± 0·5	42 ± 0·5	10	9·5	0·4	6·35 ± 0·08

6. TESTS

6.1 Mounting of the Fuse-Links — The cartridge fuse-links shall be mounted for test vertically in a metal testing enclosure (*see* Fig. 2) and shall be tested at the ambient temperature of 27 ± 5°C. Connections shall be made with electric cable soldering tag of appropriate size to each terminal to not less than 600 mm of vulcanized rubber or PVC cables having copper conductors of the following sizes [*see also* IS : 434 (Part I)-1964* and IS : 694 (Part I)-1964†]:

Rated Current A	*Nominal Cross-Sectional Area* mm^2
3 6	1·5
10	4
30 40	6

6.2 Classification of Tests

6.2.1 *Type Tests* — The following shall constitute type tests:

a) Visual examination (*see* **6.3**),

b) Checking dimensions (*see* **6.4**),

c) Test for continuity (*see* **6.5**),

d) Blow-out test/overload test (*see* **6.6**),

e) Thermal cycling test (*see* **6.7**),

f) Voltage drop test (*see* **6.8**),

g) Vibration test (*see* **6.9**),

h) Life test (*see* **6.10**), and

j) Corrosion resistance test (*see* **6.11**).

6.2.1.1 The fuse-links to be used for the type tests shall be identical with those to be used in service in all of the following details:

a) Cartridge body in all dimensions, material and process of manufacture;

b) Caps or other end-closure of the cartridge in dimensions, material and methods of attachment and sealing; and

c) Fuse-element in every respect.

---

*Specification for rubber-insulated cables: Part I With copper conductors (*revised*).

†Specification for PVC insulated cables (for voltages up to 1 100 volts): Part I With copper conductors (*revised*).

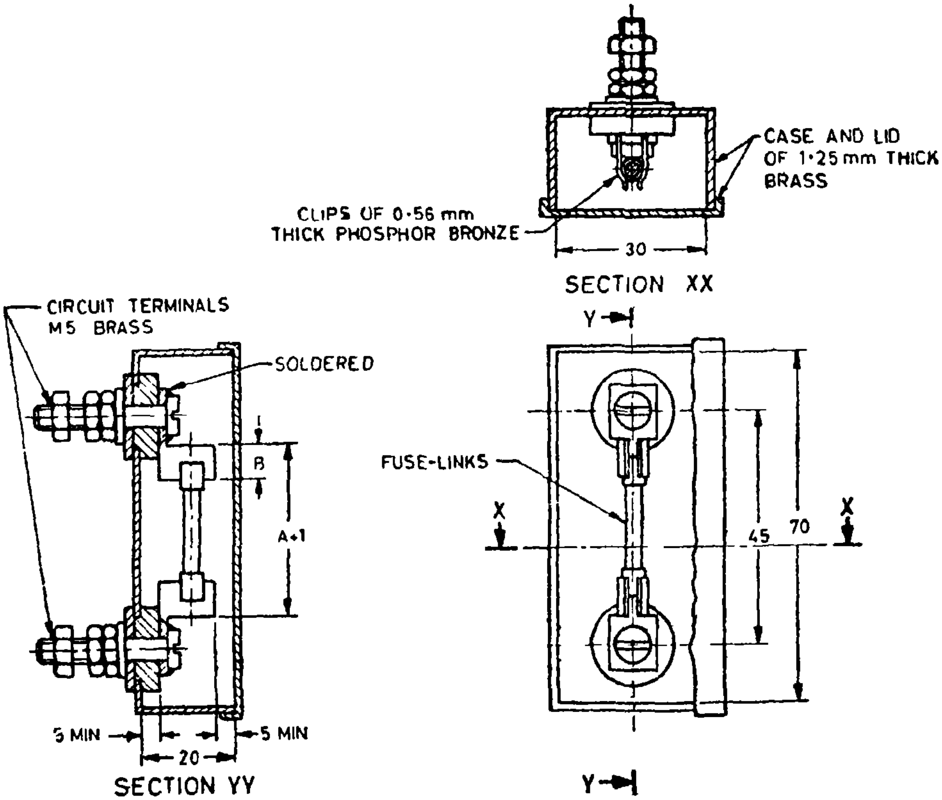
CASE AND LID OF 1·25 mm THICK BRASS
CLIPS OF 0·56 mm THICK PHOSPHOR BRONZE
30
SECTION XX
Y
CIRCUIT TERMINALS M5 BRASS
SOLDERED
B
A+1
FUSE-LINKS
X
45
70
X
5 MIN
5 MIN
20
SECTION YY
Y

FIG. 2 TESTING ENCLOSURE

6.2.1.2 *Samples for type tests* — Eighteen fuse-links for each rated current shall be selected for test purposes. These shall be divided into three groups and shall be subjected to the tests in the following manner:

18 Samples
(Routine Tests)
(*Clauses* 6.3, 6.4 and 6.5)

↓	↓	↓
First group (6 samples)	Second group (6 samples)	Third group (6 samples)
↓	↓	↓
Blow-out/Overload test (*see* **6.6**)	Thermal cycling test (*see* **6.7**)	i) Voltage drop test (*see* **6.8**), ii) Vibration test (*see* **6.9**), and iii) Life test (*see* **6.10**)

6.2.1.3 *Criterion for conformity* — If there is one failure in any particular group, another set of six samples shall be subjected to the test(s) of that particular group. If there is again any failure, the consignment shall be rejected. The fuse-link shall be deemed to comply with this standard if in any of the tests one or more of the following are not found to have occured:

a) Fuse-link has burst violently,

b) End-caps are externally damaged, and

c) Fuse-link has blown.

6.2.2 *Routine Tests* — The visual examination (*see* **6.3**), checking dimensions (*see* **6.4**) and test for continuity (*see* **6.5**) shall constitute routine tests.

6.3 Visual Examination — The fuse-links shall be visually inspected for completeness of manufacture and for appearance.

6.4 Checking Dimensions — Fuse-links shall be checked for dimensions and shall comply with **5.1.**

6.5 Test for Continuity — The fuse-links shall be tested for electrical continuity.

6.6 Blow-Out Test/Overload Test — The fuse-links shall carry 110 percent the rated current continuously and shall blow at 135 percent the rated current in less than an hour. The fuse-links shall also be tested at 150 percent the rated current and for fuse-links having rated current of 10A or less, the time to blow shall be a maximum of 15 seconds and for 30 and 40A fuse-links the time shall be a maximum of 30 seconds.

6.7 Thermal Cycling Test — The fuse-links shall perform satisfactorily for 50 000 cycles of load test. A cycle shall consist of an alternating application of 70 percent of rated load and no load for 10 seconds interval each.

6.8 Voltage Drop Test — When a fuse-link is carrying its rated current at an ambient temperature of 27 ± 5°C, the potential-drop measured between the end-caps of the fuse-link shall not exceed the values as shown in Fig. 3. The readings shall be taken when a steady value has been reached.

6.9 Vibration Test — The fuse-link, after being rigidly mounted on a suitable vibrating machine constructed to produce simple harmonic motion (a total displacement 1·5 mm) shall be subjected to vibrations through a frequency range of 10 — 55 — 10 Hz in a period of one minute. With continuously varying frequencies, the vibration shall be applied for not less than one hour in the direction of each of the three major axes of the fuse-link. At the end of the vibration test, the fuse-link shall be examined for any evidence of damage and shall pass the life test (*see* **6.10**).

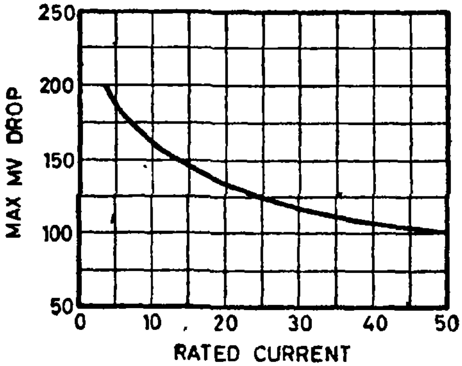

FIG. 3 MV DROP VERSUS RATED CURRENT

6.10 Life Test — The fuse-link subjected to vibration test shall carry a current equal to 110 percent of the rated current for 1 000 hours. The test shall be made with not more than 10 interruptions and the rated current shall be maintained with a tolerance of $^{+2}_{-0}$ percent. The test may be carried out at any convenient voltage.

6.11 Corrosion Resistance Test — under consideration.

7. MARKING

7.1 Cartridge fuse-links shall be identified by a printed paper placed inside the glass tube having the following information:

a) Manufacturer's name, and/or trade-mark; and

b) Rated Current.

7.1.1 Cartridge fuse-links may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg.1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephone : 27 01 31 (20 lines) **Telegrams : Manaksanstha**

Regional Offices:			Telephone
Western :	Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
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